

**Nineteenth Meeting of the Cross Polar Trans East Air Traffic Management Providers' Work Group  
(CPWG/19)**

(Tokyo, Japan, 11-15 May 2015)

**Agenda Item 6: State ATM ATS Route Catalogue**

**Polar Route Random Route/UPR Study**

**(Action Item #)**

(Presented by UNITED Airlines)

**SUMMARY**

This working paper presents information for the Group's consideration

**1. Introduction**

1.1 Following many years of discussion and improvements in Aircraft communication, navigation, and ground based Controllers work stations the CPWG Group were presented a list of potential Random Route (UPR) type scenarios to be studied for possible implementation.

1.2 United Airlines volunteered to assist in this new endeavour.

**2. Discussion**

2.1 The study shows the existing polar route and its' fixes and compares that ONE ROUTE against the proposed WIND ROUTE or UPR to provide the attached results.

2.2 Most route options were studied in both directions.

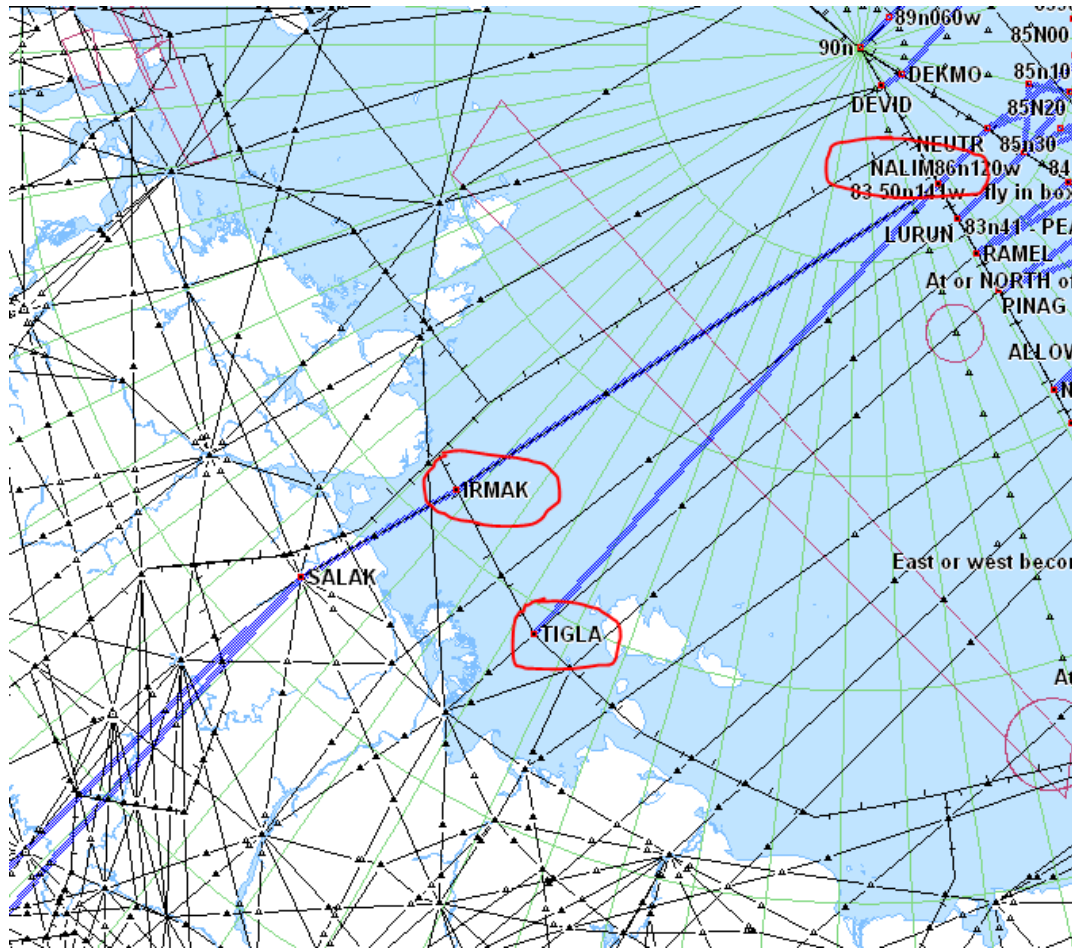
2.3 Live Flight Plan system used so Airports close to normal UAL ones had to be used so Dispatchers did not plan the test routes. RFD is close to Chicago(ORD) and JFK is close to Newark(EWR)

**3. Action by the Meeting**

3.1 The meeting is invited to:

- a. review the information contained in this Working Paper;
- b. endorse the information provided in this Working Paper.

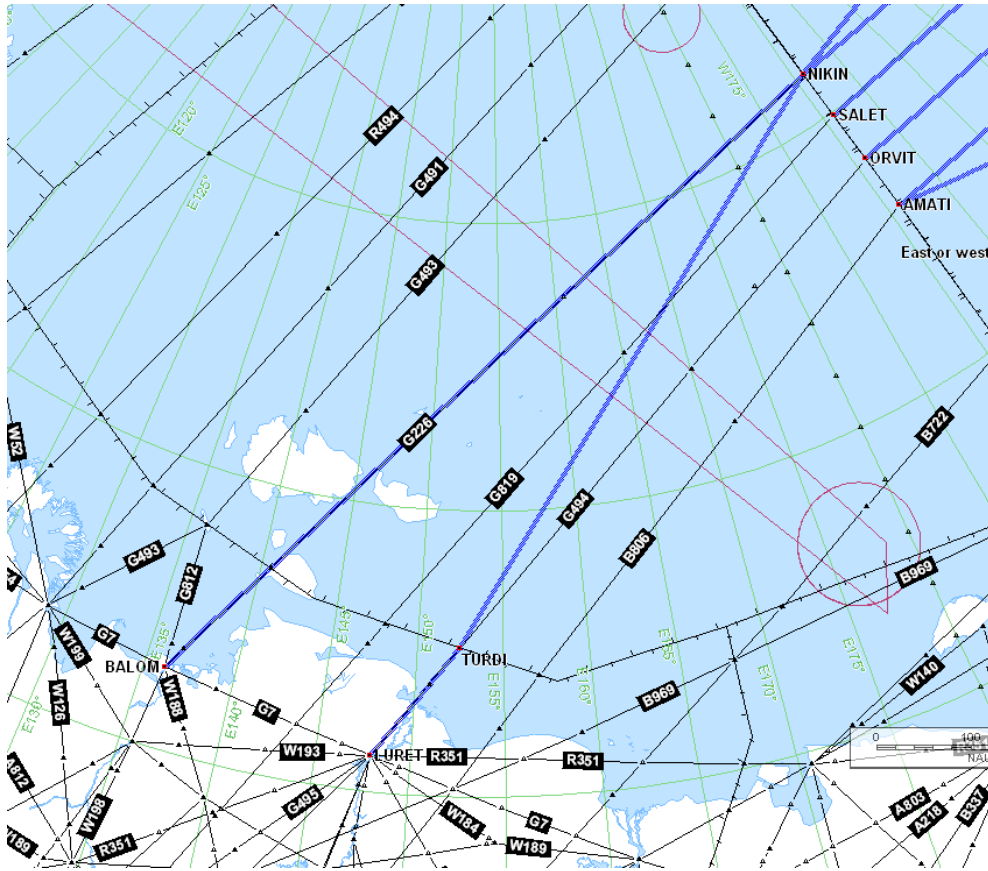
- 1a. North America Random Route to **NALIM**.G112.IRMAK then optimal Airways to destinations.  
 1b. TEST UPR is NALIM dct TIGLA Optimal routing to Far East Destinations'



Date	Route	citypair	Time	Fuel B/O or TRIPF	Distance in Nm	Beneficial
23-Mar-15	VIA OPTIMIZED-NALIM OFF	RFDHKG	15:54	228,520	7,171	
23-Mar-15	VIA OPTIMIZED-NALIM OFF (UHMM UPR TRIAL)	RFDHKG	15:48	226,280	7,078	YES
23-Mar-15	VIA OPTIMIZED-NALIM OFF	RFDPEK	13:27	191,906	6,103	
23-Mar-15	VIA OPTIMIZED-NALIM OFF (UHMM UPR TRIAL)	RFDPEK	13:20	189,174	6,082	YES
17-Feb-15	VIA OPTIMIZED-NALIM OFF	RFDPEK	14:08	192,556	6,273	
17-Feb-15	VIA OPTIMIZED-NALIM OFF (UHMM UPR TRIAL)	RFDPEK	14:04	192,102	6,180	YES
22-Feb-15	VIA OPTIMIZED-NALIM OFF	RFDPEK	14:07	194,285	6,225	
22-Feb-15	VIA OPTIMIZED-NALIM OFF (UHMM UPR TRIAL)	RFDPEK	13:59	193,600	6,132	YES
11-Feb-15	VIA OPTIMIZED-NALIM OFF	JFKHKG	16:26	204,223	7,375	
11-Feb-15	VIA OPTIMIZED-NALIM OFF (UHMM UPR TRIAL)	JFKHKG	16:14	202,735	7,282	YES
13-Feb-15	VIA OPTIMIZED-NALIM OFF	JFKPEK	14:13	197,951	6,258	
13-Feb-15	VIA OPTIMIZED-NALIM OFF (UHMM UPR TRIAL)	JFKPEK	14:00	194,155	6,170	YES

All examples for all dates saved Time, Fuel, and Emissions.

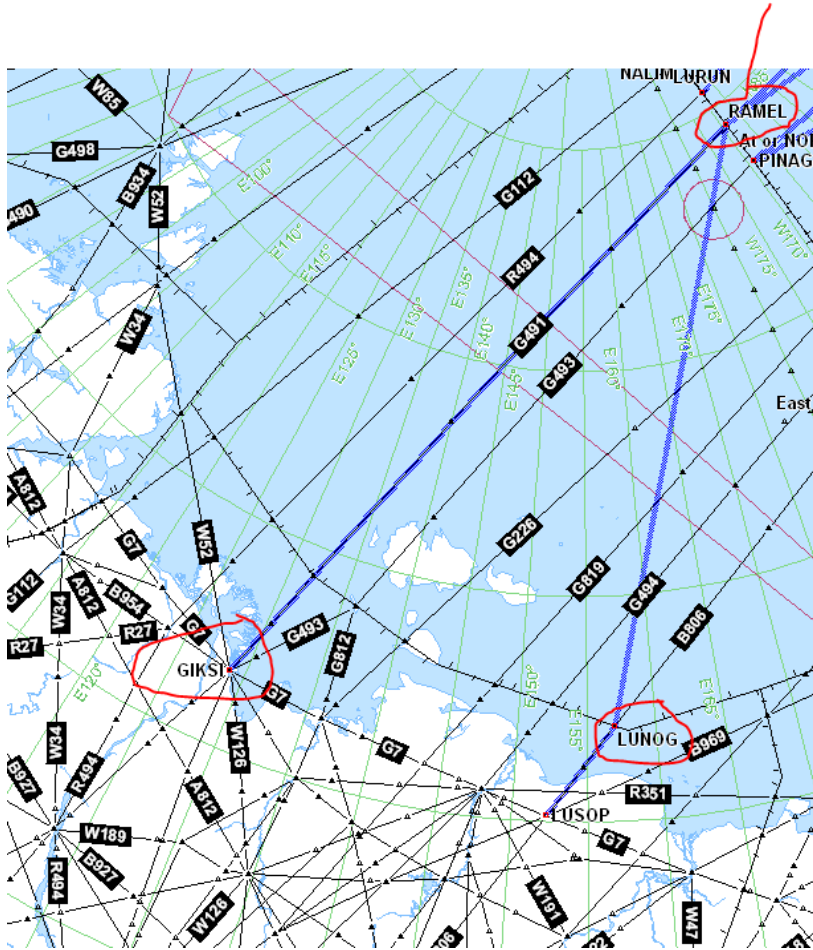
- 2a. North America Random Route to **NIKIN**.G226.BALOM then optimal Airways to destinations.  
2b. TEST UPR is NIKIN det TURDI.G494.LURET then Optimal routing to Far East Destinations’.



Date	Route	citypair	Time	Fuel B/O or TRIPE	Distance in Nm	Beneficial
23-Mar-15	VIA OPTIMIZED-NIKIN OFF	RFD PVG	14:02	202,567	6,386	
23-Mar-15	VIA OPTIMIZED-NIKIN OFF (UHMM UPR TRIAL)	RFD PVG	14:04	203,425	6,389	NO
23-Mar-15	VIA OPTIMIZED-NIKIN OFF	RFD HKG	15:39	224,927	7,034	
23-Mar-15	VIA OPTIMIZED-NIKIN OFF (UHMM UPR TRIAL)	RFD HKG	15:44	226,626	7,054	NO
23-Mar-15	VIA OPTIMIZED-NIKIN OFF	RFD PEK	13:05	186,791	5,390	
23-Mar-15	VIA OPTIMIZED-NIKIN OFF (UHMM UPR TRIAL)	RFD PEK	13:07	187,893	5,933	NO
23-Mar-15	VIA OPTIMIZED-NIKIN OFF	JFK NRT	14:02	196,628	6,371	
23-Mar-15	VIA OPTIMIZED-NIKIN OFF (UHMM UPR TRIAL)	JFK NRT	13:41	191,716	6,178	YES
22-Feb-15	VIA OPTIMIZED-NIKIN OFF	RFD PEK	14.09	196,079	6,114	
22-Feb-15	VIA OPTIMIZED-NIKIN OFF (UHMM UPR TRIAL)	RFD PEK	14.15	197,362	6,134	NO
11-Feb-15	VIA OPTIMIZED-NIKIN OFF	JFK HKG	16:25	204,071	7,344	
11-Feb-15	VIA OPTIMIZED-NIKIN OFF (UHMM UPR TRIAL)	JFK HKG	16:24	204,181	7,364	YES
13-Feb-15	VIA OPTIMIZED-NIKIN OFF	JFK PEK	14:07	196,516	6,194	
13-Feb-15	VIA OPTIMIZED-NIKIN OFF (UHMM UPR TRIAL)	JFK PEK	14:01	195,592	6,183	YES

Depends on WINDS and city pairs if beneficial as shown above.

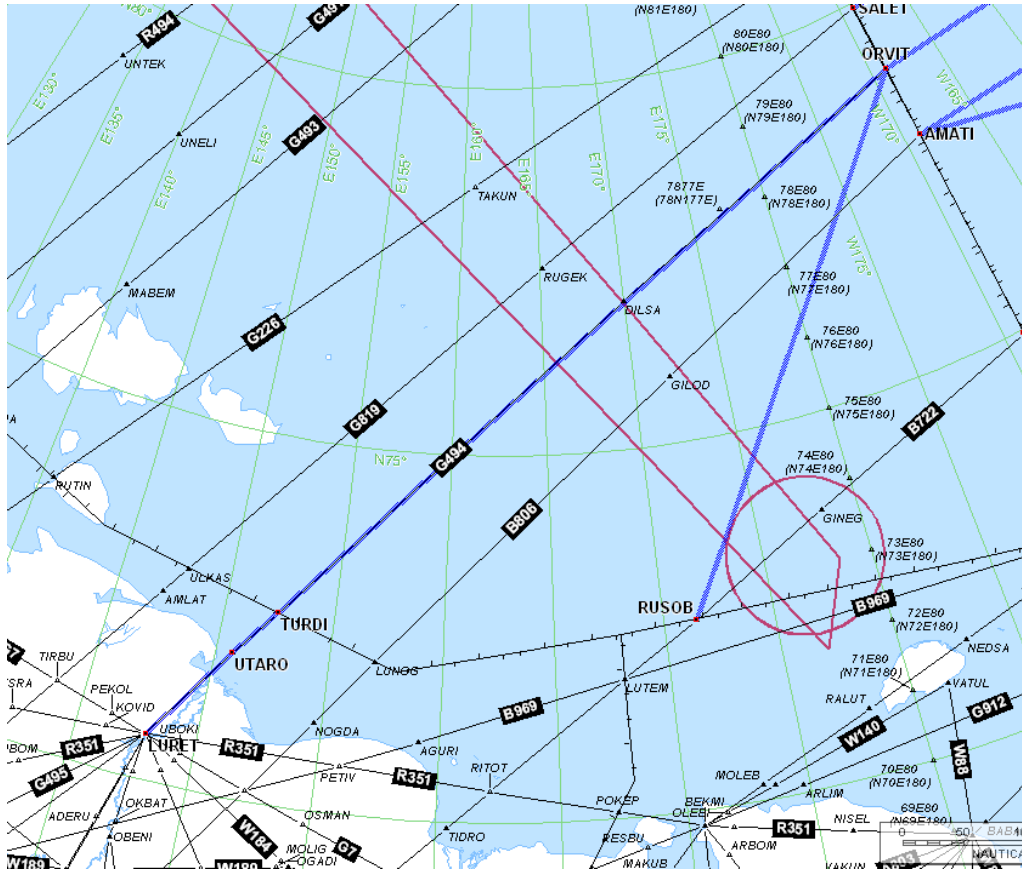
- 3a. North America Random Route to **RAMEL**.G491.GIKSI then optimal Airways to destinations.  
3b. TEST UPR is RAMEL dct LUNOG then Optimal routing to Far East Destinations’.



Date	Route	citypair	Time	Fuel B/O or TRIPF	Distance in Nm	Beneficial
23-Mar-15	VIA OPTIMIZED-RAMEL OFF	RFDNRT	13:40	195,718	6,214	
23-Mar-15	VIA OPTIMIZED-RAMEL OFF (UHMM UPR TRIAL)	RFDNRT	13:29	195,230	6,054	YES
23-Mar-15	VIA OPTIMIZED-RAMEL OFF	JFKNRT	14:02	197,854	6,421	
23-Mar-15	VIA OPTIMIZED-RAMEL OFF (UHMM UPR TRIAL)	JFKNRT	13:49	192,666	6,262	YES
11-May-15	VIA OPTIMIZED-RAMEL OFF	RFDNRT	13:37	193577	6269	
11-May-15	VIA OPTIMIZED-RAMEL OFF (UHMM UPR TRIAL)	RFDNRT	13:16	186897	6079	YES

All city pairs and all dates the UPR is beneficial versus the static route. Note only Destination NRT/RJAA studied due existing connections on south end of the route.

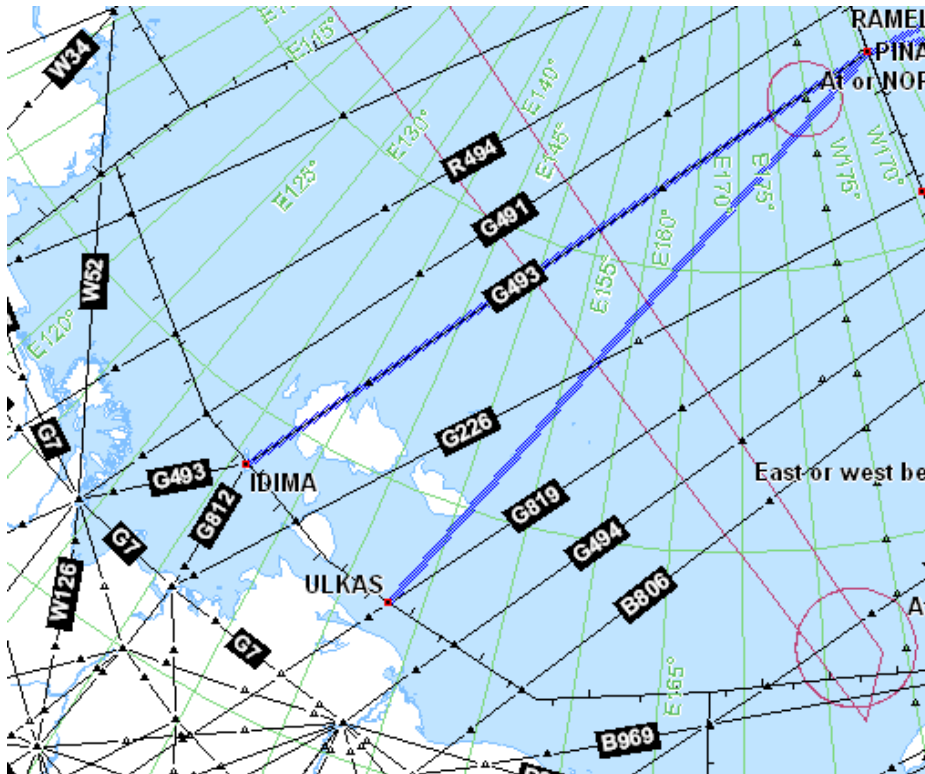
- 4a. North America Random Route to **ORVIT**.G494.LURET then optimal Airways to destinations.  
4b. TEST UPR is ORVIT dct RUSOB then Optimal routing to Far East Destinations’.



Date	Route	citypair	Time	Fuel B/O or TRIPF	Distance in Nm	Beneficial
23-Mar-15	VIA OPTIMIZED-ORVIT OFF	RFDNRT	13:05	181,879	5,875	
23-Mar-15	VIA OPTIMIZED-ORVIT OFF (UHMM UPR TRIAL)	RFDNRT	13:05	187,483	5,585	NO
23-Mar-15	VIA OPTIMIZED-ORVIT OFF	JFKNRT	13:48	191,727	6,159	
23-Mar-15	VIA OPTIMIZED-ORVIT OFF (UHMM UPR TRIAL)	JFKNRT	13:48	193,969	6,169	NO

UPR not beneficial for small sample size.

- 5a. North America Random Route to **PINAG**.G493.IDIMA then optimal Airways to destinations.  
5b. TEST UPR is PINAG dct ULKAS then Optimal routing to Far East Destinations’.

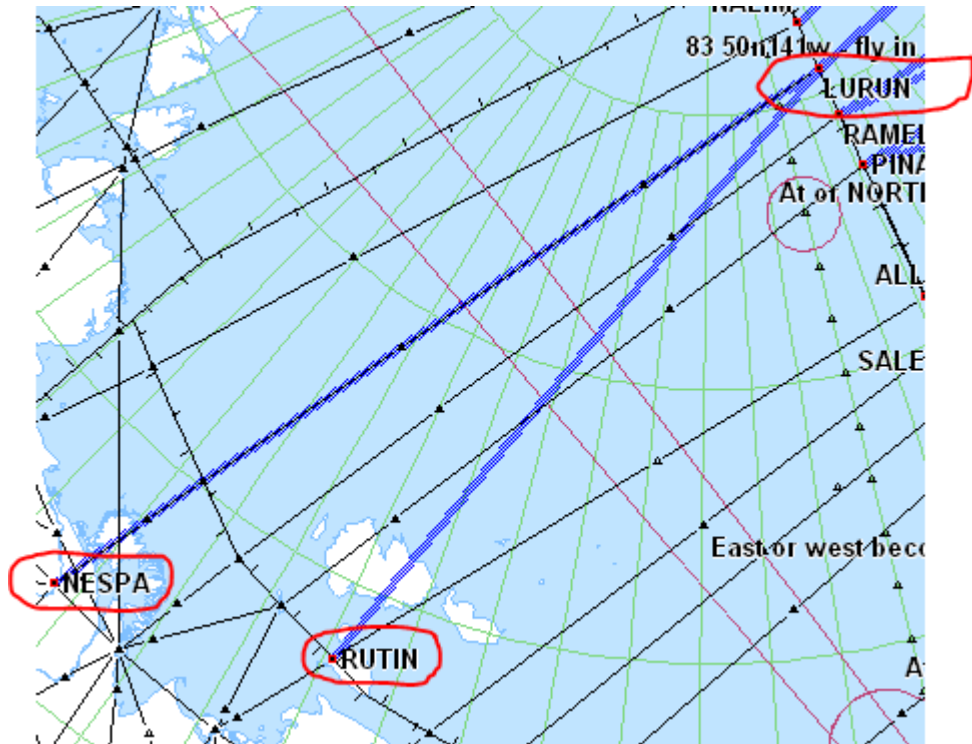


Date	Route	citypair	Time	Fuel B/O or TRIPF	Distance in Nm	Beneficial
23-Mar-15	VIA OPTIMIZED-PINAG OFF	RFDNRT	13:38	195,028	6,192	
23-Mar-15	VIA OPTIMIZED-PINAG OFF (UHMM UPR TRIAL)	RFDNRT	13:31	192,988	6,095	YES
23-Mar-15	VIA OPTIMIZED-PINAG OFF	RFDHKG	15:43	225,235	7,022	
23-Mar-15	VIA OPTIMIZED-PINAG OFF (UHMM UPR TRIAL)	RFDHKG	15:54	228,359	7,100	NO
23-Mar-15	VIA OPTIMIZED-PINAG OFF	JFKNRT	14:00	195,812	6,384	
23-Mar-15	VIA OPTIMIZED-PINAG OFF (UHMM UPR TRIAL)	JFKNRT	13:54	194,320	6,321	YES
23-Mar-15	VIA OPTIMIZED-PINAG OFF	RFDPEK	13:13	186,941	5,992	
23-Mar-15	VIA OPTIMIZED-PINAG OFF (UHMM UPR TRIAL)	RFDPEK	13:19	188,387	6,010	NO
17-Feb-15	VIA OPTIMIZED-PINAG OFF	RFDPEK	14:07	192,876	6,063	
17-Feb-15	VIA OPTIMIZED-PINAG OFF (UHMM UPR TRIAL)	RFDPEK	14:12	194,487	6,114	NO
22-Feb-15	VIA OPTIMIZED-PINAG OFF	RFDPEK	14:01	194,324	6,067	
22-Feb-15	VIA OPTIMIZED-PINAG OFF (UHMM UPR TRIAL)	RFDPEK	14:17	197,483	6,145	NO
11-Feb-15	VIA OPTIMIZED-PINAG OFF	JFKHKG	16:19	203,751	7,321	
11-Feb-15	VIA OPTIMIZED-PINAG OFF (UHMM UPR TRIAL)	JFKHKG	16:24	203,758	7,399	NO
13-Feb-15	VIA OPTIMIZED-PINAG OFF	JFKPEK	14:04	195,475	6,148	
13-Feb-15	VIA OPTIMIZED-PINAG OFF (UHMM UPR TRIAL)	JFKPEK	14:07	196,042	6,226	NO

Benefits to NRT/RJAA on days that winds favour this routing.



- 6a. North America Random Route to **LURUN**.R493.NESPA then optimal Airways to destinations.  
6b. TEST UPR is LURUN dct RUTIN then Optimal routing to Far East Destinations’.



Date	Route	citypair	Time	Fuel B/O or TRIPF	Distance in Nm	Beneficial
23-Mar-15	VIA OPTIMIZED-LURUN OFF	RFDHKG	15:42	225,828	7,064	
23-Mar-15	VIA OPTIMIZED-LURUN OFF (UHMM UPR TRIAL)	RFDHKG	15:56	229,682	7,144	NO
23-Mar-15	VIA OPTIMIZED-LURUN OFF	RFDPEK	13:17	188,736	5,974	
23-Mar-15	OPTIMIZED-LURUN OFF (UHMM UPR TRIAL)	RFDPEK	13:21	189,653	6,040	NO
17-Feb-15	VIA OPTIMIZED-LURUN OFF	RFDPEK	14:03	192,016	6,188	
17-Feb-15	OPTIMIZED-LURUN OFF (UHMM UPR TRIAL)	RFDPEK	14:10	193,987	6,241	NO
22-Feb-15	VIA OPTIMIZED-LURUN OFF	RFDPEK	13:59	192,556	6,129	
22-Feb-15	VIA OPTIMIZED-LURUN OFF (UHMM UPR TRIAL)	RFDPEK	14:16	196,994	6,209	NO
11-Feb-15	VIA OPTIMIZED-LURUN OFF	JFKHKG	16:15	202,768	7,286	
11-Feb-15	VIA OPTIMIZED-LURUN OFF (UHMM UPR TRIAL)	JFKHKG	16:23	203,215	7,366	NO
13-Feb-15	VIA OPTIMIZED-LURUN OFF	JFKPEK	14:02	194,884	6,174	
13-Feb-15	VIA OPTIMIZED-LURUN OFF (UHMM UPR TRIAL)	JFKPEK	14:07	196,031	6,254	NO

No city pairs show a benefit for this small sample size.

- 7a. North America Random Route to **AMATI**.B806.LUSOP then optimal Airways to destinations.  
7b. TEST UPR is AMATI dct IDIMA then Optimal routing to Far East Destinations’.



Date	Route	citypair	Time	Fuel B/O or TRIPF	Distance in Nm	Beneficial
23-Mar-15	VIA OPTIMIZED-AMATI OFF	RFDHKG	15:39	225,628	7,033	
23-Mar-15	VIA OPTIMIZED-AMATI OFF (UHMM UPR TRIAL)	RFDHKG	15:34	224,111	7,014	YES
17-Feb-15	VIA OPTIMIZED-AMATI OFF	RFDPEK	13:55	191,400	6,009	
17-Feb-15	VIA OPTIMIZED-AMATI OFF (UHMM UPR TRIAL)	RFDPEK	13:59	192,023	6,040	NO
22-Feb-15	VIA OPTIMIZED-AMATI OFF	RFDPEK	14:02	196,123	6,043	
22-Feb-15	VIA OPTIMIZED-AMATI OFF (UHMM UPR TRIAL)	RFDPEK	13:56	195,676	6,024	YES
11-Feb-15	VIA OPTIMIZED-AMATI OFF	JFKHKG	16:30	205,427	7,388	
11-Feb-15	VIA OPTIMIZED-AMATI OFF (UHMM UPR TRIAL)	JFKHKG	16:33	206,406	7,369	NO
13-Feb-15	VIA OPTIMIZED-AMATI OFF	JFKPEK	14:04	196,597	6,218	
13-Feb-15	VIA OPTIMIZED-AMATI OFF (UHMM UPR TRIAL)	JFKPEK	14:16	199,629	6,236	NO

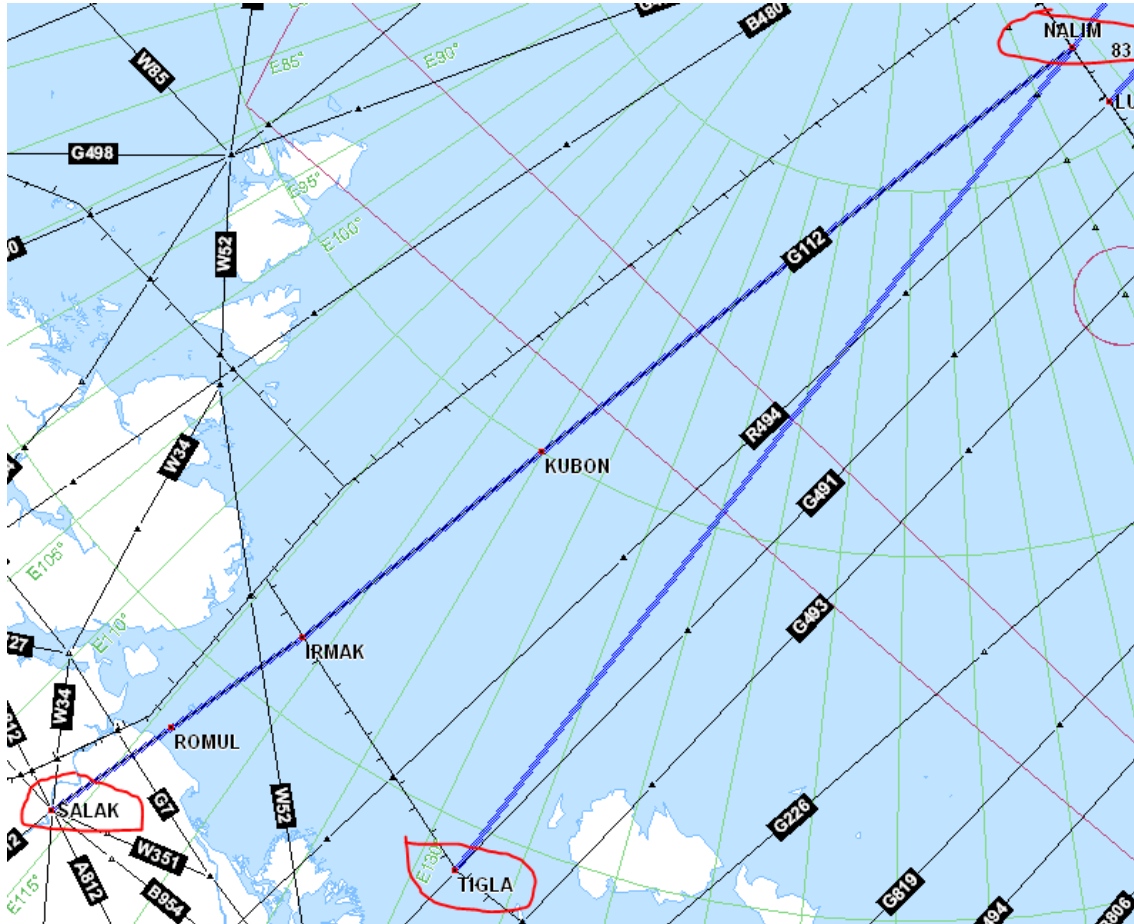
UPR shows surprising benefits depending on winds.

**END of North America to Asia study.**



## ASIA to North America Study

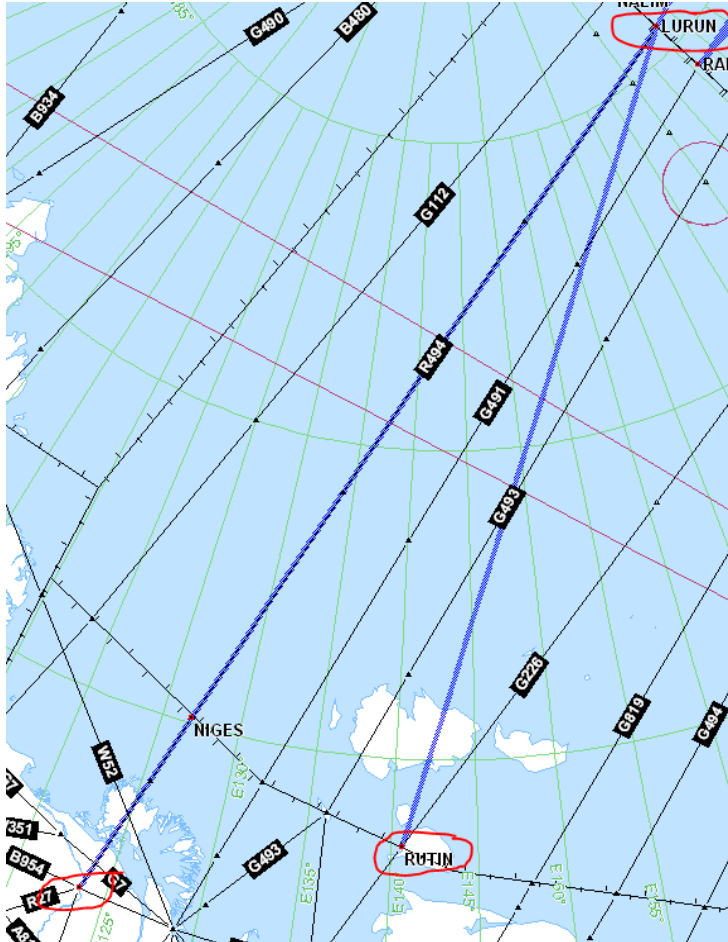
- 8a. Asia via Optimal Airways to **NALIM**, then optimal Airways to destinations.  
8b. TEST is Optimal Airways to TIGLA dct NALIM then Optimal routing to North America destinations.



Date	Route	citypair	Time	Fuel B/O or TRIPF	Distance in Nm	Beneficial
29-Apr-15	VIA OPTIMIZED-NALIM OFF	PVGJFK	14:31	210,303	6,798	
29-Apr-15	VIA OPTIMIZED-NALIM OFF (UHMM UPR TRIAL)	PVGJFK	14:07	203,297	6,629	YES
28-Apr-15	VIA OPTIMIZED-NALIM OFF	HKGJFK	15:40	238,635	7,356	
28-Apr-15	VIA OPTIMIZED-NALIM OFF (UHMM UPR TRIAL)	HKGJFK	15:27	236,084	7,263	YES
29-Apr-15	VIA OPTIMIZED-NALIM OFF	PEKJFK	13:08	185,773	6,208	
29-Apr-15	VIA OPTIMIZED-NALIM OFF (UHMM UPR TRIAL)	PEKJFK	12:54	181,630	6,115	YES

Beneficial for all 3 Chinese to North America studied city pairs – 28/29 APR 15.

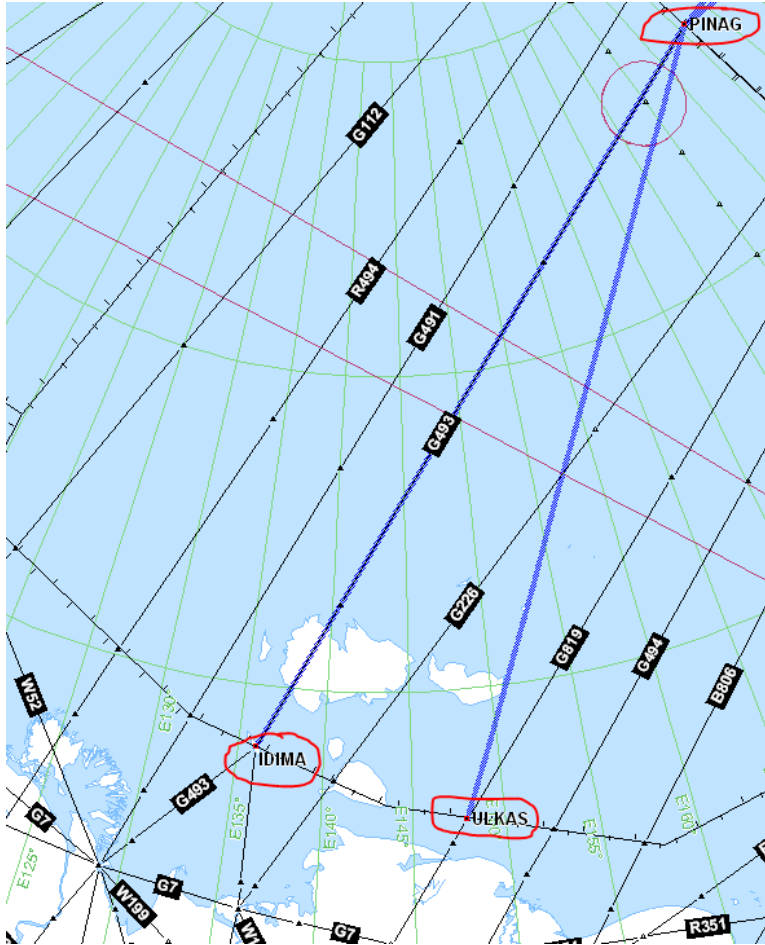
- 9a. Asia via Optimal Airways to **LURUN**, then optimal Airways to destinations.  
9b. TEST is Optimal Airways to RUTIN dct LURUN then Optimal routing to North America destinations.



Date	Route	citypair	Time	Fuel B/O or TRIPF	Distance in Nm	Beneficial
29-Apr-15	VIA OPTIMIZED-LURUN OFF	PVGJFK	14:16	205,808	6,681	
29-Apr-15	VIA OPTIMIZED-LURUN OFF (UHMM UPR TRIAL)	PVGJFK	14:05	202,129	6,615	YES
28-Apr-15	VIA OPTIMIZED-LURUN OFF	HKGJFK	15:28	236,481	7,255	
28-Apr-15	VIA OPTIMIZED-LURUN OFF (UHMM UPR TRIAL)	HKGJFK	15:37	238,168	7,349	NO
29-Apr-15	VIA OPTIMIZED-LURUN OFF	PEKJFK	12:55	181,925	6,107	
29-Apr-15	VIA OPTIMIZED-LURUN OFF (UHMM UPR TRIAL)	PEKJFK	13:00	182,878	6,188	NO

Good benefit can be gained depending on the winds over the full route.

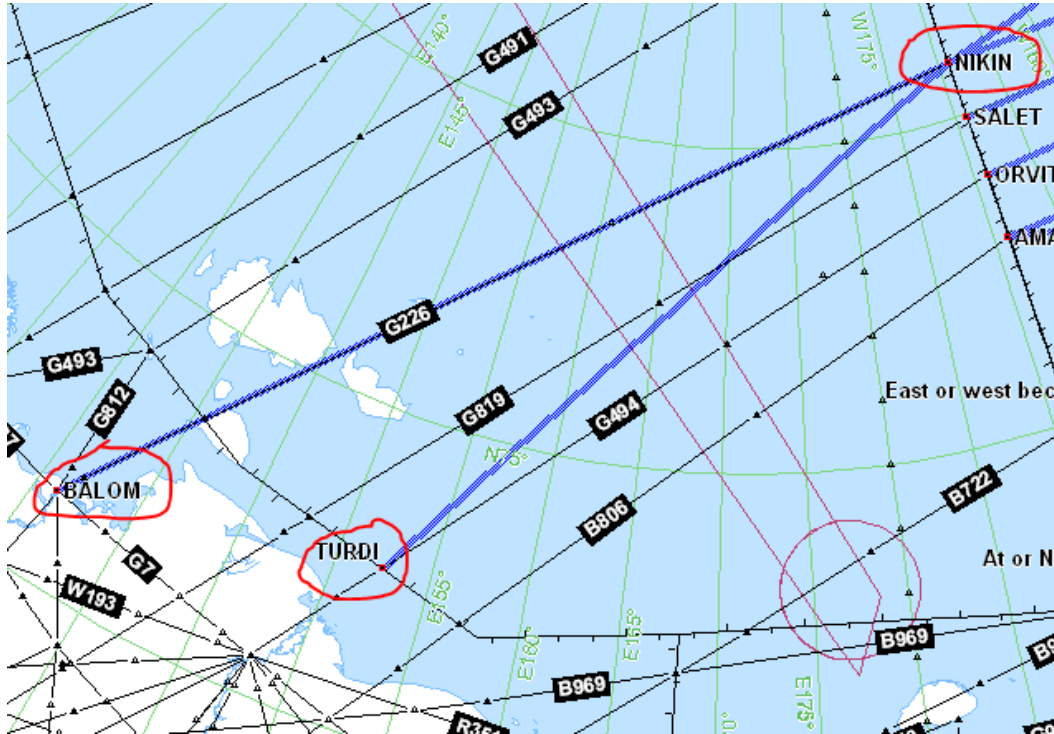
- 10a. Asia via Optimal Airways to **PINAG** then optimal Airways to destinations.  
10b. TEST is Optimal Airways to ULKAS dct PINAG then Optimal routing to North America destinations.



Date	Route	citypair	Time	Fuel B/O or TRIPF	Distance in Nm	Beneficial
29-Apr-15	VIA OPTIMIZED-PINAG OFF	PVGJFK	14:04	202,076	6,605	
29-Apr-15	VIA OPTIMIZED-PINAG OFF (UHMM UPR TRIAL)	PVGJFK	14:04	201,835	6,623	YES
28-Apr-15	VIA OPTIMIZED-PINAG OFF	HKGJFK	15:30	236,800	7,263	
28-Apr-15	VIA OPTIMIZED-PINAG OFF (UHMM UPR TRIAL)	HKGJFK	15:37	238,192	7,341	NO
29-Apr-15	VIA OPTIMIZED-PINAG OFF	PEKJFK	12:54	181,859	6,121	
29-Apr-15	VIA OPTIMIZED-PINAG OFF (UHMM UPR TRIAL)	PEKJFK	12:59	182,565	6,199	NO

Depending on the Full routes winds this can be beneficial.

- 11a. Asia via Optimal Airways to **NIKIN**, then optimal Airways to destinations.  
11b. TEST is Optimal Airways to TURDI dct NIKIN then Optimal routing to North America destinations.

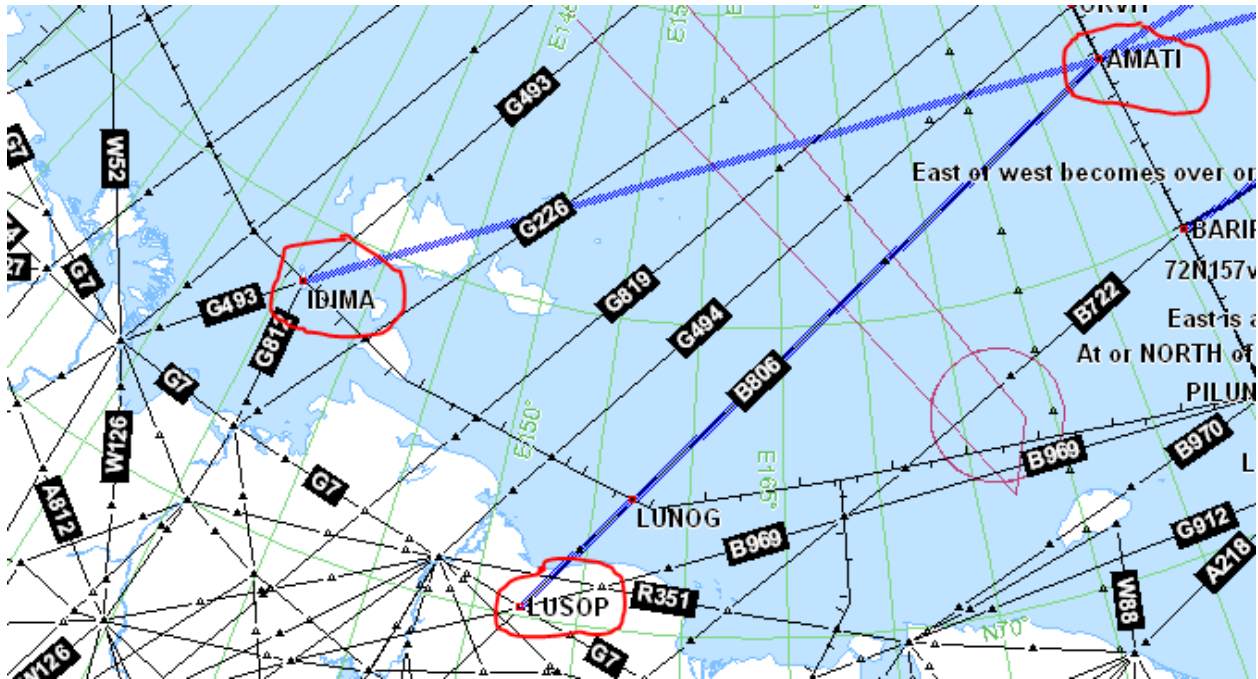


Date	Route	citypair	Time	Fuel B/O or TRIPF	Distance in Nm	Beneficial
29-Apr-15	VIA OPTIMIZED-NIKIN OFF	PVGJFK	14:02	199,781	6,611	
29-Apr-15	VIA OPTIMIZED-NIKIN OFF (UHMM UPR TRIAL)	PVGJFK	14:01	198,555	6,644	YES
28-Apr-15	VIA OPTIMIZED-NIKIN OFF	HKGJFK	15:37	238,388	7,330	
28-Apr-15	VIA OPTIMIZED-NIKIN OFF (UHMM UPR TRIAL)	HKGJFK	15:36	238,100	7,335	YES
29-Apr-15	VIA OPTIMIZED-NIKIN OFF	PEKJFK	12:58	181,903	6,214	
29-Apr-15	VIA OPTIMIZED-NIKIN OFF (UHMM UPR TRIAL)	PEKJFK	12:57	181,434	6,232	YES

All city pairs in small sample size show a potential benefit.

12a. Asia via Optimal Airways to **AMATI**, then optimal Airways to destinations.

12b. TEST is Optimal Airways to IDIMA dct AMATI then Optimal routing to North America destinations.



Date	Route	citypair	Time	Fuel B/O or TRIPF	Distance in Nm	Beneficial
29-Apr-15	VIA OPTIMIZED-AMATI OFF	PVGJFK	13:58	197,131	6,640	
29-Apr-15	VIA OPTIMIZED-AMATI OFF (UHMM UPR TRIAL)	PVGJFK	14:11	201,849	6,708	NO
28-Apr-15	VIA OPTIMIZED-AMATI OFF	HKGJFK	15:35	238,168	7,375	
28-Apr-15	VIA OPTIMIZED-AMATI OFF (UHMM UPR TRIAL)	HKGJFK	15:37	238,939	7,356	NO
29-Apr-15	VIA OPTIMIZED-AMATI OFF	PEKJFK	12:55	180,565	6,237	
29-Apr-15	VIA OPTIMIZED-AMATI OFF (UHMM UPR TRIAL)	PEKJFK	13:00	182,995	6,218	NO

Current city pairs used in this study do not show a benefit.